REMARKS

The courtesies extended to the undersigned by Examiner Hemant Desai during the brief telephone interview initiated by the undersigned on October 24, 2008 are acknowledged and appreciated. Applicant, his principal representatives in Germany, and the undersigned have carefully reviewed the non-final Office Action in the subject US patent application, together with the prior art cited and relied on in the rejection of the claims. In response, independent claim 22 has again been amended in a further effort to patentably define the subject invention over the prior art cited and relied on. It is believed that claim 22, as currently amended, is patentable over that prior art. Reexamination and reconsideration of the application, and allowance of the claims, is respectfully requested.

As was discussed briefly with Examination Desai on October 24, 2008, the subject invention is directed to a longitudinal product folding device. As may be seen in Figs. 1 and 2 of the application, the product 02, such as a cross-folded signature, is supported by a transport track and is moved along to a folding table 04 where it is folded by a vertically reciprocable folding blade 03. The folding blade 03 pushes the product 02 down through a longitudinal slot in the folding table 04 and into engagement with a pair of folding rollers, such as are depicted schematically at 07 in Fig. 1. Systems of this general configuration are very well known in the prior art.

The problem with such systems is one of coordination of the reciprocation of the folding blade 03 with the position of the product 02. A folding blade drive mechanism, such as the one depicted schematically at 05 in Fig. 1, is usable to vertically reciprocate the folding blade. A control device 10 is used to control the folding blade. Clearly, it is important that the folding blade reciprocation be coordinated with, or synchronized with the time of arrival of the product 02 beneath the folding blade 03. If the blade is lowered before the product is completely beneath it, the product will not be properly folded. It will be engaged by the blade only at its leading edge and will be dragged into the folding rollers at an angle.

If the product 02 is situated beneath the folding blade and has to wait for an appreciable length of time before the blade comes down on it, time will be wasted. The speed of operation of the printing press is limited by the speed at which the product 02 can be longitudinally folded by the folding blade 03, which imparts a third fold to the product 02. As may be seen in Fig. 10, the imparting of this third fold is a limiting factor on the speed of the operation of the printing press. A shunt mechanism is often used to split the flow of twice folded products 02 into two separate streams that are directed to two separate third folding devices, as indicated at 01 in Fig. 10.

Regardless of the number of third folding devices which are potentially used, each such third folding device still requires some kind of coordination with the product being folded so that the blade will engage the product as soon as that product is properly situated beneath the blade. Too early a lowering of the blade will result in improper folding. Too late a lowering of the blade will result in the wasting of time.

The twice folded products are typically transported to the folding table 04 by a transport track, such as a drive belt. As will be understood, the actual positioning of each product 02 on the transport track can vary from its preferred position. Variations in speed of the printing press and variations in the speed of operation of the first and second folded formes can affect the time at which the twice folded product is placed on the transport track. Any slippage between the transport track and the folded product 02 will also vary the arrival time of the twice folded product beneath the folding blade. A simple variable, such as relative humidity, can affect the coefficient of friction between the folded products 02 and the transport track. Ultimately, what is needed is a system that can react very quickly to variations in the location of individual printed products, and which can synchronize the vertical reciprocation of the folding blade with the actual arrival time of the printed product 02 beneath the folding blade.

In accordance with the present invention, as recited in currently amended claim 22, and as is described in paragraphs 0017 and 0058 of the Substitute Specification, as well as at other

locations in that document, there is provided an optical product sensor, generally at 18, which is located along the path of travel of the printed products 02, and before the vertically reciprocable folding blade. As is set forth at paragraph 0058, this sensor determines a product phase relation of the printing product 02. This means that the optical sensor 18 looks at the twice folded product 02, at a specific time, as that product passes by sensor 18, and determines one of several things. For example, the sensor 18 can determine the position of the printed product 02, a time of passage of a certain portion of the printed product 02 or the like. What the sensor 18 does is to "look" at the printed product 02 and compares what it actually sees to which it should see at that specific time so that the operation of the folding blade will be syncronized with the arrival of the printed product. When the product sensor 18 optically detects the product phase relation of the twice folded product 02, it then sends the information to the folding blade drive motor control device. That device, in turn, can then properly control the folding blade drive motor so that the vertical reciprocation of the folding blade is synchronized with the product folding time so that the product is properly folded. The determination of the product phase relation of each folded product, at the location of the sensor, upstream of the folding blade, is the factor that is used to control the operation of the folding blades. This operation is not shown, or suggested, in the prior art.

In the Office Action of July 25, 2008, claims 22, 23 and 33 were rejected under 35 USC103(a) as being unpatentable over European reference 1211212 to Bressert, in view of US Patent No. 5,267,935 to Bialek et al. Claims 24-29 and 37 were rejected under 35 USC103(a) as being unpatentable over Bressert in view of Bialek and further in view of US. Patent No.4,269,402 to Fischer. Claims 30-37 were rejected under 35USC103(a) as being unpatentable over Bressert in view of Bialek and further in view of DE19802895.

Since claim 22 is the sole independent claim now pending in the subject application, the bulk of the following discussion will be directed to the rejection of that claim It was asserted in the Office Action that EP1211212 shows a product folding device with the majority of the

structure of the subject invention. The undersigned generally concurs. It was asserted in the Office Action that EP '212 shows a product sensor at 12. It is noted that 12 is used, at least in the Abstract, to identify the sheets to be folded. It is assumed that the detector should have been indicated as element 14.

The EP '212 reference was admitted as not showing the synchronization of the vertical reciprocation of the folding blade by measuring the product phase relation. It was asserted that the secondary Bialek reference shows that it is known "... to synchronize the folding blade by measuring the product phase relation" (emphasis added), by relying on Column 4, lines 15-19 of that reference. As will be discussed below, the asserted teaching set forth in the Office Action, is, in fact, not a part of the secondary reference to Bialek. Bialek does not teach, or suggest, product phase relation as being usable to control a position of the reciprocable folding blade.

In the EP '212 reference, as was discussed in the Second Amendment filed July 10, 2008 and to which discussion the Examiner is respectfully requested to refer, there is shown a reciprocable folding blade 34. A product, such as sheets 12, are to be longitudinally folded by reciprocation of the folding blade. A detector 14 is situated before, in the direction of sheet travel, the folding blade 34. A distance "D" between that detector 14 and the folding blade 37 is known. Also known is a speed of travel of the sheets 12 between the detector 14 and the folding blade 34. The abstract of EP '212 describes operation of the folder knowing the speed of the sheets. With this information, and knowing the distance D between the detector 14 and the folding blade 34, the release point and the required velocity profile of the blade 34 are calculated. Again, these calculations are based on a determination of the time that the sheet will reach the folder, as determined by the time that the start of the sheet is detected, at a set distance, from the folder. In other words, when the start of a sheet 12 passes under the detector 14, and knowing the speed of travel of the sheet and the distance D the sheet has to

travel, the operation of the blade can be controlled. This is not the same as the device that is recited in claim 22, as amended, as will be discussed below.

In the Office Action of July 25, 2008, it was acknowledged that EP '212 does not teach or suggest the control or reciprocation of the folding blade as a function of product phase relation. The secondary reference to Bialek was cited as showing such a relationship. Upon a close reading of that secondary reference, it is evident that the phase relation recited in Bialek has to do with the folding blade not with the product.

In the Bialek reference, a folding blade 4 is used to push products down between a pair of folding rollers 5. The bulk of the discussion on the Bialek reference is directed to the structure and operation of the drive mechanism for use in causing the folding blade 4 to reciprocate. At Column 4, starting at line 7, there is set forth a discussion of the production of the product to be folded. A folding table 2 conveys the product to be folded to a position below the folding blade 5. The point of time of impact of the folding blade 4 with the product to be folded, and thus the point of time of the folding of the product, "...may be adjusted ...by adapting the phase relationship of the folding blade 4 with respect to the folded product". (emphasis added). The phase relationship of the folding blade, with respect to the product, is adjusted. The phase of the folding blade is its position in its reciprocating path; i.e., whether it is moving up, dwelling at the top of the stroke, moving down, or dwelling at the bottom of the stroke.

All of these longitudinal folding devices have to adjust or to coordinate or synchronize the phase position of the folding blade with the location of the product to be folded. However, that is not the same as the use of the phase position relation of the product to be folded to control the operation of the folding blade. In Bailek, there is no discussion of the criteria that is used to adjust the phase relationship of the folding blade. It is recited as being adjusted in a known manner.

The only other discussion of phase relationship adjustment of the folding blade in the secondary Bialek reference is set forth at Column 7, lines 3-11. There, it is discussed that the folding blade is driven by a drive shaft 32 through a pair of bevel gears 31. The phase position of the drive shaft 37 is able to be adjusted, again in a known manner. This adjustment of the phase position of the drive shaft results in an adjustment of the folding blade 4, with reference to the folded copy. Again, there is no discussion of the basis that is usable to vary the phase position of the drive shaft.

The use of the term "phase position" or "phase relationship" in the Bailek reference in connection with the folding blade drive shaft or in connection with the folding blade 4 is not the same as the recitation in the subject application of the use of an optical product sensor to determine a product phase relationship of the product. That product phase relation of the product is the location of the product, with respect to the product sensor. That information is then used to control the operation of the folding blade drive motor. In the EP '212 reference, the detector 14 is used to detect the passage of the leading edge of the sheets. That is not the same as the use of the subject optical product sensor to detect the product phase relation. In the EP '212 reference, the sensor is always on, and detects the arrival of the leading edge of the product. In the subject invention, the optical product sensor is operated at a specific time and detects the product phase. In EP '212, the arrival of the product leading edge at the sensor is used to control the blade. In the subject invention, the product phase relation with respect to the sensor; i.e., what part of the product is beneath the sensor at a specific time, is used to control the folding blade. The desired result of proper folding of the product is the same. The mechanism used to obtain that result is different.

The teachings of the Bialek reference, as discussed above, do not provide the features that are missing from the EP '212 reference. At best, Bialek confirms that the folding blade has to be coordinated with the product to be folded. The use of the terms "phase relationship" or "phase position" in Bialek, in conjunction with the location of the folding blade, does not add

unilaterally to the teachings of the EP '212 reference, at least with respect to coordination of the blade reciprocation and the product phase relation. For these reasons, claim 22, as currently amended, is believed to be patentable.

All of the rest of the claims that are pending in the subject application are dependent on believed allowable claim 22, as currently amended. These claims are thus also believed to be allowable. The several other references cited to show the features of these dependent claims do not provide the teachings which are missing from the EP '212 and Bialek references.

The newly cited US Patent No. 5,171,204 does not appear to have been relied on in the rejection of the claims. No further discussion thereof is believed to be required.

SUMMARY

Independent Claim 22 has been further amended to more clearly patentably define the subject invention over the prior art cited and relied on. The rest of the claims now pending in the application depend from believed allowable independent claim22 and are thus also believed to be allowable.

Allowance of the claims and passage of the application to issue is respectfully requested.

Respectfully submitted,

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